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| **Project 2.1.4 Choosing a Problem** |

Introduction

Like the blueprints for building a house, a problem statement acts as the plan that the researcher follows as he performs the research. The problem statement must focus the separate pieces of work on the same goal. Like a blueprint, the more accurate and detailed the problem statement, the more likely the project will succeed.

The most fundamental component of a solid research project is a clear and concise problem statement. If the problem statement does not contain specific language, the researcher may go off on tangents. A solid, in-depth understanding of the research and information surrounding a specific topic will support such a statement.The ability to specifically identify and define a valid problem to be solved is a true hallmark of a successful professional in any field.

Equipment

* Engineering notebook
* Working with Experts and Mentors document
* Problem Statement Evaluation
* Problem Statement Rubric
* Problem Statement Matrix
* Patent Summary Sheet
* Research Summary Sheet
* EDD Resources
* Correspondence Log
* Effective Research document

Procedure

Your team members were brought together because you all have interest in one or more similar topics. In this activity your team will begin with those common interests and work toward formulating a problem statement that will define the problem on which you will work for the remainder of the year. Remember that you must document all work related to your design project.

1. Individually propose three problem statements for consideration. Use the Problem Statement Evaluation to improve each.

Top Problem Statements

Idea 1- Gum Gets Stuck to Your Shoe

Idea 2- Door Closing

Idea 3- Garbage Overflow

Idea 4- Vending Machines Take Your Money

Idea 5- Tangled Wet Flag

Idea 6- Headphones Pull Out of Ears

Idea 7- Take Too Long to Gather Change

Idea 8- Mechanical Pencil Erasers Don't Last Long

Idea 9- Suitcases Wrinkle Clothing

1. For each problem statement, collect three credible sources that indicate that the problem exists. Use the **Effective Research** document to evaluate each source. If you cannot find three credible sources (see **Research Summary Sheet**), then adjust the problem statement or use a different one so that the problem is at least preliminarily validated.

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| **Research Summary Sheet** |

Instructions:

Complete the following form for each artifact that validates your problem statement.

Source (APA format):

http://www.gumraps.com/gum\_litter.html

Artifact Summary:

Summarize in your own words. Highlight the key pieces, including features and benefits.

Used chewing gum collects dirt/dust and other foreign objects and will stick to almost anything it comes in contact with, this means shoes and animals. The problem with improperly disposed chewing gum is that it permanently sticks to whatever surface it lands on. Chewing gum is non-biodegradable, meaning that when it is on the ground it will stay on it for awhile.

Artifact Critique:

How does the artifact provide validity, conflict, or the need for further research? What unique aspect does the artifact add to your overall research?

The artifact provides validity because it contains a website that has donations and is copyrighted. There might be the need for further research because there are only the main ideas listed on this website. It adds the unique aspect that gum is a non-biodegradable item to the overall research of our group.

Source (APA format):

http://www.ehow.com/how\_879\_remove-gum-shoe.html

Artifact Summary:

Summarize in your own words. Highlight the key pieces, including features and benefits.

It gives a step-by-step way to remove gum off your shoes once it is stuck on your shoe. It also gives warnings and tips when doing this process.

Artifact Critique:

How does the artifact provide validity, conflict, or the need for further research? What unique aspect does the artifact add to your overall research?

This artifact provides validity because it shows that gum getting stuck to a shoe is a problem because if it wasn’t such a big problem there wouldn’t be a step-by-step process on how to solve the problem of removing gum of the shoe. This does not require further research because it proves that the problem exists clearly. The unique aspect that is added to my overall research is the process on how to remove the piece of gum once it is on your shoe. This could add to the list of possible solutions we can have for our project.

Source (APA format):

"Best Cleaning Available Made Possible for Texas Residents." Press Release Distribution, Public Relations Services | SBWire. Web. 01 Dec. 2011. <http://www.sbwire.com/press-releases/sbwire-116643.htm>.

Artifact Summary:

Summarize in your own words. Highlight the key pieces, including features and benefits.

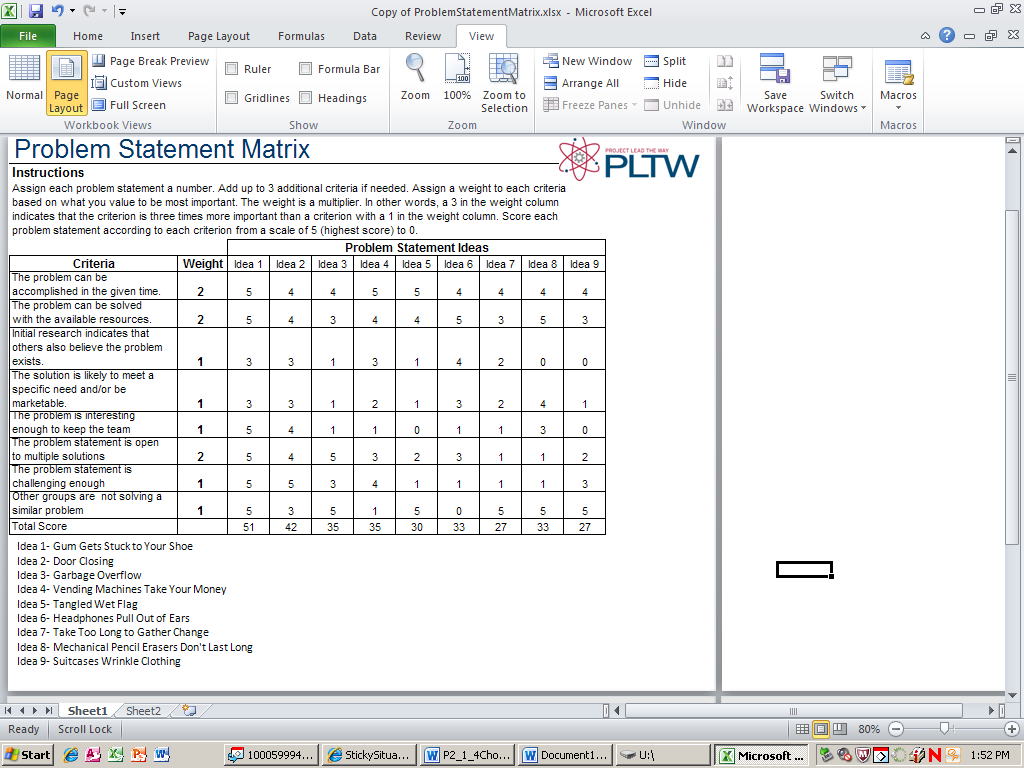
This article states that Texas residents call for removal of grime from surfaces, gum removal, graffiti removal, and parking lot cleaning and stripping. These tasks are all described in this article, but the most convenient one for our project was that of gum removal. It states that chewed gum is found under tables and sidewalks. The gum piece then serves as a breeding ground for bacteria. Gum is hard to remove once it has stuck to a solid surface. The company can approach gum removal with the steam pressure washing as well to get all of the gum to be removed.

Artifact Critique:

How does the artifact provide validity, conflict, or the need for further research? What unique aspect does the artifact add to your overall research?

It provides validity that the issue does exist because it shows the gum removal tactics of removing the piece of gum. It also states that gum is hard to remove once it is stuck to a solid surface. Both these facts state that the problem does exist or there wouldn’t be a explanation of how hard it is to remove the piece of gum, and we are trying to stop getting gum from getting stuck to the shoe in the first place. The unique aspect the artifact added to the overall research was that it said that a gum piece is a breeding ground for bacteria. This could help us be careful when we test or come across a piece of dried gum on the ground.

1. Assign a number to each problem statement. Each member of the team should individually evaluate each one. Compare notes, and as a group select a problem. Use the **Problem Statement Matrix** to help you choose among the ideas. Keep in mind that your problem statement may change or may be modified during a later stage.



1. Locate five associations, organizations, or professional societies that relate to your chosen topic area.

* Record contact information for each organization in the Contacts section of your engineering notebook.
  + Request information from each group that will help advance your research. Be sure to record the details of your correspondence in the chronological section of your engineering notebook. You may use the Correspondence Log to record the appropriate information about your contact and then insert the information into your engineering notebook.

1. Using the **Working with Experts and Mentors** document as a guide, contact at least two experts and obtain feedback on the problem statement that you are considering.
   * Record the experts’ contact information in the Contacts section of your engineering notebook.
   * Request that the experts mail information to your group. Be sure to record the details of your correspondence in the chronological section of your engineering notebook. You may use the Correspondence Log to record the appropriate information about your contact and then insert the information into your engineering notebook.



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| **Correspondence Log** |

Instructions

Keep the first table as a template. Copy and paste the template as additional entries are needed.

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| 11/29/2011 | Correspondence Notes / Email Transcripts |
| Good Afternoon \_\_\_\_\_\_,    Our names our Avani Patel, Phil Bagley, and Kamile Berenyte and we are students from the Bartlett High School Academy of Science, Engineering & High Technology, Illinois School District U-46. As juniors, we are enrolled in an Engineering Design and Development class where we actively participate in researching, designing and are working on building a prototype device based on our problem statement. The purpose of this project is to let us experience the engineering world, and be prepared for it. We have received your contact information from the web, and we are asking for your help and/or sponsorship of our team. We hope that we have contacted the correct person, but if not please send it to an appropriate expert . Please take a look at our problem statement below to clarify the problem we are working on. We have identified you as a possible contact of relevance that could provide us with valuable information and feedback. If you have any comments or concerns regarding this message please email us at avani0811@yahoo.com or call us at (224) 659-6384. Thank you for your time and effort.  Regards, Team Sticky Situation    PROBLEM STATEMENT: Women’s shoes that have flat, smooth bottoms do not provide any resistance to sticky gum. In 1871, the gum production escalated with the patent of a gum manufacture machine; today, over 374 billion sticks of gum are made yearly, and when not disposed of properly, gum becomes a sticky situation. Women in urban areas have agreed that they hate it when there is gum stuck on their shoes as evidenced by the amount of responses to the online search “I hate it when gum is stuck on my shoe.” Although there are many answers on how to effectively remove the gum from your shoes, there are no solutions on how to keep the gum from sticking to the shoe in the first place. |
| Contacts: |
| 1. The Wrigley Company 2. Joel Dalhauser 3. Asfaque Memon 4. Robert Clark 5. Karuna Patel |
| Contact Titles: |
| 1. Company 2. CAD Artist 3. Environmental Consultant 4. Model Makers 5. Chemist |
| Contact Information: |
| 1. 410 North Michigan Avenue   Chicago, Illinois 60611  1-312-644-2121   1. Walker Parking Engineering, INC.   505 David Road, Bartlett, 60103  1-630-483-2020   1. 419 Elsehower Ln, Lombard, 60148   ATC Associates  1-630-916-7272   1. Centenine Models   4N370 84 Court, Hanover Park, 60133  1-630-668-4343   1. 1-630-525-1461 |
| Subject: |
| Engineering, Chemistry, and Gum Companies |
| Follow-up Required - Date | Action Items |
| Click here to enter a date. |  |

1. Find and record at least six patents that solve a problem similar to yours or that poorly solve your problem.
   * Print each patent and complete a **Patent Summary Sheet** for each.



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| **Patent Summary Sheet** |

**Instructions:**

Complete the following form for each patent. Each patent should document a solution to a problem similar to yours or should provide a solution in need of improvement.

**Source (APA format):**

Markley, Jim “Apparatus for removing a deposit of chewing gum from a surface” Patent Number 5,333,337. August 2, 1994, Print.

**Patent Number:** 5,333,337

**Patent Summary:**

Summarize the patent in your own words. Highlight the key pieces of information, including features and benefits.

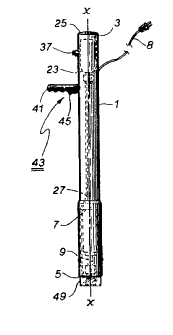
An apparatus for removing a deposit of gum from an underlying flat surface. An electric drive motor including a rotatable drive shaft to create a low center of gravity. A fluid reservoir for liquid gum remover is also integrated into the design for proper upward washing action.

**Patent Critique:**

How does the patented item solve or attempt to solve your problem or a similar one? What are some good and bad attributes of the item? What unique aspect does the patent add to your overall research?

The patented item attempts to solve our problem or a similar one because it removes the gum from surfaces efficiently by combining a few ideas into one. This is the unique aspect of the patent because it also includes a compartment that holds a liquid that can be dispensed for easier gum removal. The good attributes are that it is highly affordable, efficient, portable, and efficient. The bad attribute is that it may require some maintenance because of the liquid refill.

**Images/sketches:**



**Source (APA format):**

Kawai, Yuzo. “Chewing Gum Remover” Patent Number 5,839,154. November 24, 1998. Print.

**Patent Number:** 5,839,154

**Patent Summary:**

Summarize the patent in your own words. Highlight the key pieces of information, including features and benefits.

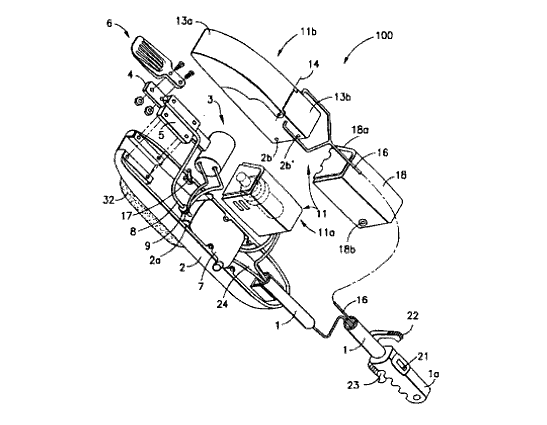
A device for removing gum under surfaces that employs a reciprocating scraper that separates the substance from the surface to be cleaned. A liquid is discharged from the scraper such as a cleaning solution. A vacuum draws air and loosens the matters into the nozzle and traps it in the opening.

**Patent Critique:**

How does the patented item solve or attempt to solve your problem or a similar one? What are some good and bad attributes of the item? What unique aspect does the patent add to your overall research?

The patented item attempts to solve our problem or a similar one because it removes the gum from surfaces efficiently incorporating many methods into one. This is the unique aspect of the patent as well it releases a chemical, has a scrapers installed, and vacuums the gum off the surface. The good attributes are that it is highly affordable, efficient, portable, and efficient. The bad attribute is that it may require some maintenance because of the complicated parts it includes the chemical has to be refilled and the container has to be emptied when full.

**Images/sketches:**



Source (APA Format):

"Non-stick Coating and Method of ... - Google Patents." *Google*. Web. 29 Nov. 2011. <http://www.google.com/patents?id=ShWqAAAAEBAJ>.

Patent Number: 7375152

Patent Summary:

Summarize the patent in your own words.Highlight the key pieces of information, including features and benefits.

The patents is for non-stick coating for flexible surfaces such as fluoropolymer, an acrylic polymer, and a polyol and/or diol.

Patent Critique:

How does the patented item solve or attempt to solve your problem or a similar one? What are some good and bad attributes of the item? What unique aspect does the patent add to your overall research?

This solution addresses the problem of having surfaces that easily allow for materials to stick to them. It is a coating that can be applied on certain materials to give it a non-stick layer. It’s chemical composition may be very useful for out problem solutions when considering materials and chemicals that can provide us with gum resistant surfaces.

Source (APA Format):

"Cleaning Agent for the Removal of ... - Google Patents." *Google*. Web. 29 Nov. 2011. <http://www.google.com/patents?id=hDWWAAAAEBAJ>.

Patent Number: 10296501

Patent Summary:

Summarize the patent in your own words.Highlight the key pieces of information, including features and benefits.

The patents is for a cleaning agent that comprises phosphate compounds and aids in the removal of gum when used with steam assisted tools.

Patent Critique:

How does the patented item solve or attempt to solve your problem or a similar one? What are some good and bad attributes of the item? What unique aspect does the patent add to your overall research?

This solution addresses the removal of gum using tools that also require the help of a cleaning agent for best results. This agent, as others, does not directly approach the problem as we wish to go about ours, but it also provides ideas for chemicals that work well in assistance of removing/dissolving gum.

Source:

US Patent and Trademark Office Patent Full-Text and

Image Database. Google. Web. 29 Nov. 2011

Patent Number: 4087662

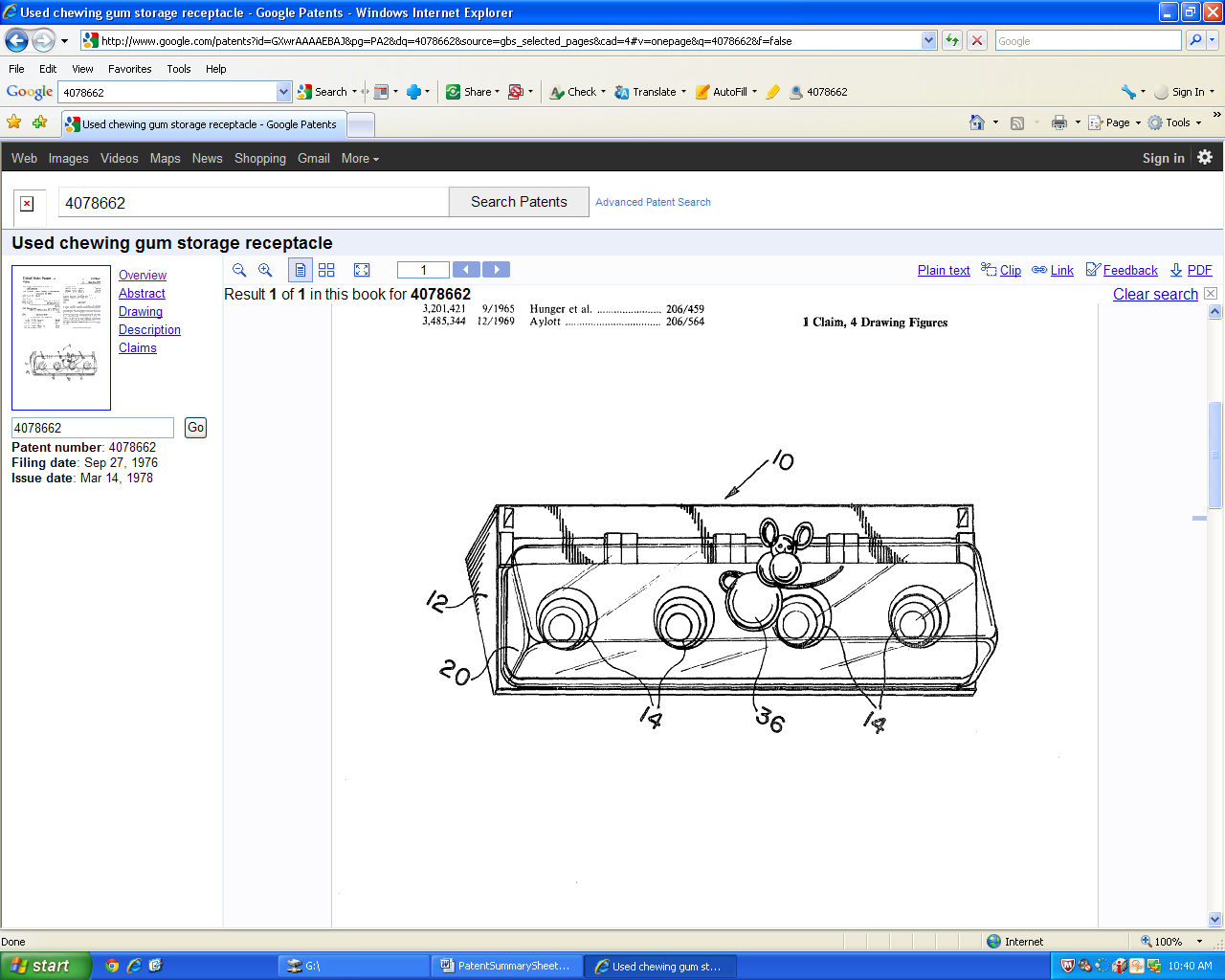
Patent Summary:

Summarize the patent in your own words. Highlight the key pieces of information, including features and benefits.

A pocket sized box that is designed to hold already chewed gum. it has four compartments to store the gum.

Patent Critique:

How does the patented item solve or attempt to solve your problem or a similar one? What are some good and bad attributes of the item? What unique aspect does the patent add to your overall research?

This solution addresses the disposal of gum in wrong places. It provides the user with pocket sized box that easily stores away used gum. it approaches the problem from a different view; however, supports that disposal of gum in improper places is a problem. It is unlikely that people will bother with carrying around such a device though.

Source:

"Methyl Ester-based Chewing Gum Remover - Google Patents." Google. Web. 29 Nov. 2011. <http://www.google.com/patents?id=k3wNAAAAEBAJ>.

Patent Number: 6613158

Patent Summary:

Summarize the patent in your own words.Highlight the key pieces of information, including features and benefits.

The patent is for a gum removal agent that works in helping to remove the stickiness of the gum to make it easily scraped off.

Patent Critique:

How does the patented item solve or attempt to solve your problem or a similar one? What are some good and bad attributes of the item? What unique aspect does the patent add to your overall research?

This solution solves the problem of gum removal being a hard task. Although it does not approach the problem from the perspective that we do, it provides insight on chemicals and procedures that aid in the removal of gum.

1. As a team research at least 10 artifacts that support the validity of your problem statement and provide supporting information. To validate your problem, show that experts believe it to be a problem, consumer/users believe it to be a problem, that data supports the need for a solution, and/or that examples exist of unsuccessful attempts to solve the problem or that the attempts to solve the problem have significant flaws.
   * Document each artifact and complete a **Research Summary Sheet** for each.



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| **Research Summary Sheet** |

Instructions:

Complete the following form for each artifact that validates your problem statement.

Source (APA format):

"Council Faces Big Chewy Clean-up Bill | Geelong, VIC, Australia." Geelong, Surf Coast - Australia | News, Weather, Sports, Geelong Cats, Beaches, Events - All about Geelong, Victoria, Australia | Geelong, VIC, Australia. Web. 01 Dec. 2011. <http://www.geelongadvertiser.com.au/article/2011/11/29/294341\_news.html>.

Artifact Summary:

Summarize in your own words. Highlight the key pieces, including features and benefits.

This article states that a city has “rubbish” on the ground and it doesn’t make their city an attractive place to visit. It states that the city spends $230,000 a year on footpath scrubbing to remove gum of the pathway. Directly stated from the article, “chewing gum is a particular pain not only because it can stick on people's shoes but it is extremely difficult and costly for our maintenance employees to scrape it off the footpath.”

Artifact Critique:

How does the artifact provide validity, conflict, or the need for further research? What unique aspect does the artifact add to your overall research?

It provides validity that the issue does exist because this city is spending so much money on cleaning up the gum that is thrown on the ground. It also clearly stated that getting gum stuck to your shoe is also a pain. This provides information that our problem also exists, but in this case is the minor problem compared to the city’s gum removal issue. The unique aspect it adds to the overall research is it shows that removing gum can be both painful and costly.

Source (APA format):

http://www.amazon.com/Dont-Throw-Your-Gum-Ground/dp/B0012PFUOI

Artifact Summary:

Summarize in your own words. Highlight the key pieces, including features and benefits.

This is a kid song that tells its audience not to throw your gum on the ground. It tells a child that throwing gum on the ground it bad manners and can be stepped on.It was labeled by Chase West Productions, Llc and is a 1minute and 22 second song.

Artifact Critique:

How does the artifact provide validity, conflict, or the need for further research? What unique aspect does the artifact add to your overall research?

This artifact provides validity because there is a song made about stopping the process of throwing gum on the ground! The unique aspect that this artifact adds to the overall research is that society is trying to kids good manners of not throwing gum on the ground from their childhood, so their habits carry into adulthood.

Source (APA Format):

Gummy Bins® - The Solution to the Chewing Gum Problem - Home Page. Web. 29 Nov. 2011. <http://www.gummybin.com/>.

Artifact Summary:

Summarize in your own words. Highlight the key pieces, including features and benefits.

Gummy bins are an eye catching way to attract gum chewers who wish to dispose of their gum, working to reduce the disposal of gum in places like tables, walls and ground. Since it is aesthetically appealing and something different, it attracts people’s attention and is therefore effective in its purpose.

Artifact Critique:

How does the artifact provide validity, conflict, or the need for further research? What unique aspect does the artifact add to your overall research?

This artifact is one of the many that tries to solve the problem of gum being disposed of improperly and the getting stuck on shoes, clothing, and other materials. It doesn’t benefit us in the way of choosing solutions, but it does show the society’s concern with the environmental and unpleasing concerns that sticky gum creates.

Source (APA Format):

"Pave-Saver Is the Ultimate Invisible Chewing Gum Repellent for Pavement Surface Protection and Stone Protection from Go-Gum." Chewing Gum Removal, Graffiti Removal, and Permanent Anti Graffiti and Anti Chewing Gum Coatings from Go-Gum Limited. Web. 29 Nov. 2011. <http://www.getridofgum.com/anti\_chewing\_gum\_solution.html>.

Artifact Summary:

Summarize in your own words.Highlight the key pieces, including features and benefits.

Pave-Saver is a substance used to coat pavement or other usually outside surfaces to make it resistant to stains as well as gum

Artifact Critique:

How does the artifact provide validity, conflict, or the need for further research? What unique aspect does the artifact add to your overall research?

This artifact is one of the many that tries to solve the problem of gum being disposed of improperly and the getting stuck on shoes, clothing, and other materials. It doesn’t benefit us in the way of choosing solutions, but it does show the society’s concern with the environmental and unpleasing concerns that sticky gum creates.

Source (APA Format):

"Gum Scraper." Xerion Solutions. Web. 28 Nov. 2011. <http://www.xerionsolutions.com/xerion-gum-scraper.html>.

Artifact Summary:

Summarize in your own words.Highlight the key pieces, including features and benefits.

It is a gum scraper that works best with the addition of a few drops of solvent to remove and scrape of tar and gum.

Artifact Critique:

How does the artifact provide validity, conflict, or the need for further research? What unique aspect does the artifact add to your overall research?

It provides validity to our problem as well as showing how people have tried to approach the problem. It is a scraper so it requires human effort working on a single piece of gum at the time. Once again, as most solutions to approaching our problem, it deals with once the gum is actually stuck on a surface and needs to be easily removed.

8) Create a document that conveys your final problem statement. Include the most significant supporting information that you found during your research. Be sure that your problem statement answers all of the following questions:

* + Who says there is a problem?

Women in the suburban area.

* + What exactly is the problem?

Gum getting stuck to the shoe in the first place.

* + Where does the problem exist?

In the suburban area (city).

* + When has it happened and for how long?

Since gum has been manufactured.

* + How prevalent is the problem (statistics)?

374 billion sticks of gum are made yearly.

**PROBLEM STATEMENT:** Women’s shoes that have flat, smooth bottoms do not provide any resistance to sticky gum. In 1871, the gum production escalated with the patent of a gum manufacture machine; today, over 374 billion sticks of gum are made yearly, and when not disposed of properly, gum becomes a sticky situation. Women in urban areas have agreed that they hate it when there is gum stuck on their shoes as evidenced by the amount of responses to the online search “I hate it when gum is stuck on my shoe.” Although there are many answers on how to effectively remove the gum from your shoes, there are no solutions on how to keep the gum from sticking to the shoe in the first place.